REMARKS

Upon entry of the foregoing amendment, claims 1-10, 12-49, 51-56, and new claims 57-85 are currently pending in the case. Of the originally filed and previously presented claims 1-56, claims 1-13, 26-37, 50, 51, and 53 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Buchanan et al. ('404) in view of Bowen ('761) and further in view of C.O. Mork. Previously presented and originally filed claims 14-25, 38-49, and 52 stand objected to as being dependent upon a rejected base claim, but allowable if rewritten in independent form, including all of the limitations of the base claim and any intervening claims. Originally filed claims 54-56 stand allowed over the prior art of record.

Claims 1 and 27 are amended to clarify that the data analysis system of the apparatus and method of the present invention correlates absorbance to at least one predetermined reaction component in the molten polycarbonate polymer and/or oligomer sample to provide real-time monitoring of the composition of the polycarbonate during production. Support for this amendment is found in the specification, for example at paragraphs 19 and 32 as well as paragraphs 42-50, and 53 describing use of the apparatus of Figure 1 for real-time monitoring and stopped-flow measurements as described in Figures 3 and 4.

New claims 57-64 comprise originally filed claims 14-21, and new claims 66-69 comprise originally filed claims 22-25, amended, as suggested by the Examiner, to include all of the limitations of the base claim and any intervening claims. New claims 71-78 comprise originally filed claims 38-45, and new claims 80-83, and 85 comprise originally filed claims 46-49, and 52 amended, as suggested by the Examiner, to include all of the limitations of the base claim and any intervening claims. New claims 65, 70, 79, and 84 describe the application of multivariate analysis to the apparatus and methods, and are supported in the specification, for example at ¶¶ 53-61 and Example 2, describing application of multivariate analysis to measurement of Fries in polycarbonate.

Claims 11 and 50 are canceled without prejudice to, or disclaimer of, the matter described therein. Additional amendments are proposed to clarify minor inconsistencies in the wording of some of the claims. Accordingly, no new matter has been added by the amendment of the claims.

Issue Fee Payment

Applicants note for the record that the issue fee for this application was paid on September 11, 2003, but that the application was subsequently withdrawn from issue on the basis of a new grounds of rejection. Applicants do not request reimbursement of the issue fee at this time, but ask that upon allowance of the claims as requested herein, that the issue fee be waived.

The Rejection of Claims Under 35 U.S.C. § 103(a) is Traversed or Rendered Moot

The Examiner rejected claims 1-13, 26-37, 50, 51, and 53 as being allegedly unpatentable over Buchanan et al. ('404) in view of Bowen ('761) and further in view of C.O. Mork. Thus, the Examiner stated that:

> Buchanan et al. ('404) discloses a light source (Col. 3, lines 45-46); a fiber optic transmission probe (Col. 3, lines 34-36), wherein said probe transmits at least one substantially monochromatic radiation (Col. 3, line 45) from said light source to irradiate a sample comprising at least one polymer and/or oligomer and collects light transmitted from said irradiated sample (Col. 6, lines 59-67); a spectrophotometer, wherein said spectrophotometer monitors radiation comprising UV/visible light absorbed by said irradiated sample (Col. 5, lines 26-41).
>
> Buchanan et al. ('404) in combination with C.O. Mork substantially teaches the claimed invention except that it does not show a data analysis system for determining absorbance at one predetermined reaction component. Brown et al. ('761) shows that it is known to provide a data analysis system for determining the predetermined reaction component (Col. 6, lines 31-58) for an optical probe apparatus. It would have been obvious to combine the device of Buchanan et al. ('404) in view of C.O. Mork with the data analysis of Brown et al. ('761) for the purpose of providing chemical identification and qualitative and quantitative concentrations from any type of in situ analysis, therefore increasing the amount of materials that can be examined and identified.
>
> Buchanan et al. ('404) in view of Brown et al. ('761) substantially teaches the claimed invention except that it does not show the sample is a polycarbonate polymer. C.O. Mork shows that it is known to provide measurement of polycarbonate polymer (See Synopsis) for a measurement system. It would have been obvious to combine the device of Buchanan et al. ('404) in view of Brown et al. ('761) with the polycarbonate polymer of C.O. Mork for the purpose of being able to measure the concentration

> levels of the material, therefore allowing the user to determine when the amount of impurities have exceeded a certain level.

Office Action at pages 2-3.

Applicants respectfully note for the record that Brown et al ('761) cited in the Office Action is actually U.S. Patent No. 4,802,761 to Bowen et al., cited on form PTO-892 attached to the Office Action (referred to herein as Bowen ('761)). That the actual reference is in fact Bowen et al. ('761) was confirmed in a telephonic interview held on December 15, 2003, between the Examiner and Applicants' attorney.

Applicants respectfully assert that Buchanan et al. ('404), in view of Bowen ('761), and further in view of C.O. Mork does not render Applicants' claimed invention obvious. As amended, Applicants' claimed invention comprises an apparatus and method for real-time monitoring of polycarbonate during production. Buchanan et al. ('404) describes a heat resistant probe for spectroscopic analysis which is made by controlled conditions in which the optical illuminating and collecting fibers of the probe are sealed to a solder plug at the probe tip. See Buchanan et al ('404) at 3:52 to 4:26, describing the importance of preparing the solder plug and then inserting the optical fibers, rather than forming the plug around the fibers. Buchanan et al. goes on to describe that most commercially available high-temperature probes do not withstand long-term exposure to an inhospitable environment. Buchanan et al. ('404) at 5:42 to 6:3. Thus, reading Buchanan et al. ('404), one would be discouraged from trying to use commercially available high-temperature probes for on-line, real-time measurement of molten polycarbonate.

In contrast, Applicants describe and claim a method and apparatus that uses standard, commercially-available probes in a format that allows for real-time analysis of molten polycarbonate polymer and/or oligomer composition, where the measured absorbance is correlated to at least one predetermined reaction component in the molten polycarbonate polymer/oligomer. Applicants' specification describes that the probe may be placed outside of the molten polymer or may be inserted directly into the polymer preparation. See Applicants' specification at ¶ ¶ 45-46. Applicants' invention describes methods and systems which, due to the configuration of the system and the use of

rigorous data analysis techniques, allow for flexibility in probe design and thus, do not require the use of a specialized high-temperature probe.

Furthermore, although US '404 to Buchanan describes that the high temperature probe of the invention may be immersed in an inhospitable environment such as that used for polymer formation (see US '404 at 5:41-6:3), there is no description of the nature of the polymer formed, or the spectra obtained. Thus, there is absolutely no description in US '404 to Buchanan of measurement of polycarbonate products and/or intermediates. US '404 to Buchanan only teaches that the specific probe of the invention is stable to harsh environments for a period of time.

Nor are the deficiencies of US '404 to Buchanan remedied by Bowen ('761) and/or Mork. Bowen describes a system for remote measurement of analytes by Raman spectroscopy using optical fibers. Applicants respectfully assert that the generalized discussion of using algorithms to store and collect spectra for the identification and quantification of a sample as provided by Bowen ('761) does not render obvious the types of analyses described and claimed in Applicants' application. There is absolutely no teaching in Bowen ('761) of real-time, *in situ* measurement of molten polycarbonate products and/or intermediates as is described and claimed in Applicants' invention.

The deficiencies of US '404 to Buchanan and Bowen ('761) are not remedied by Mork. The assay method described by Mork requires a gel permeation chromatography-ultraviolet technique which, as distinguished from Applicants' invention (see Applicants' specification at ¶ 4), is a post-reaction sampling technique appropriate to interfacial polymerization in which the reaction occurs in an organic solvent. The gel permeation chromatography technique used by Mork (and others) requires that the sample be dissolved in a pre-selected solvent for analysis. Notably, not all polycarbonate samples can be dissolved. Some of the samples may gel due to the presence of high levels of Fries products. Thus, the chromatography method described by Mork provides only for off-line analysis, and not real-time monitoring.

In addition, as Mork is concerned with polycarbonate made by the interfacial process, there is absolutely no description in Mork of measurement of Fries product, and how Fries can be measured in molten polycarbonate. Thus, Mork does not enable real-time measurement of molten polycarbonate made by melt polymerization. Nor does

Mork describe the measurement of reaction components of melt polycarbonate production.

In fact, Mork teaches the difficulties of non-chromatagraphy based analysis techniques in distinguishing free phenolic groups from those groups on the end of a polymer chain. Mork at page 436, cols. 1-2. Thus, reading Mork, one would be discouraged from trying to quantify uncapped phenolic groups in a polycarbonate sample using a method other than gel permeation chromatography.

Thus, Applicants respectfully assert that Buchanan et al. ('404), in light of the data analysis systems described Bowen ('761) and further in view of the GPC-UV assay of polycarbonate described by Mork, does not suggest nor enable Applicants' invention, as is required for a determination of obviousness under 35 USC 103(a). *See e.g.*, *Motorola, Inc. v. Interdigital Technology Corp.*, 43 U.S.P.Q. 2d 1481, 1489 (Fed. Cir. 1997) (quoting *Beckman Instruments, Inc. v. LKB Produkter AB*, 13 U.S.P.Q. 2d 1301, 1304 (Fed. Cir. 1989) (holding that in order to render a claimed apparatus or method obvious, the prior art must enable one skilled in the art to make and use the apparatus or method). There is no description in these references of the application of commercially available probes in combination with specific data analysis systems for the real-time UV/visible measurement of molten polycarbonate polymers/oligomers and intermediates thereof during polycarbonate production.

The Federal Circuit has held that the totality of a reference's teachings must be considered in finding whether the reference in fact suggests the invention in question, or teaches away from the invention in question. *W.L. Gore & Assocs. V Garlock, Inc.*, 220 USPQ 303, 311 (Fed. Cir. 1983). As described above, reading Buchanan et al. ('404), one would be discouraged from trying to use commercially available high-temperature probes for on-line, real-time measurement of polymer production. Also, reading Mork, one would be discouraged from using a non-chromatography based assay for the characterization of functional groups present in a polycarbonate sample.

To establish a prima facie case of obviousness three criteria must be met: (i) a suggestion or motivation to modify or combine references; (ii) a reasonable expectation of success; and (iii) all the limitations in the claim(s) must be taught or suggested by the reference, or combination of references. MPEP 706.02(j). Applicants respectfully assert

that neither of the references cited by the Examiner alone, or in combination, teach all of the limitations of Applicants' claimed invention. Nor is there any suggestion, upon reading these two references, to combine the references in a way that teaches Applicants' invention. Also, because Buchanan et al. ('404) teaches away from the use of both standard and commercially available high-temperature UV/optical probes as described by Applicants' claimed invention, and Mork teaches away from using a non-chromatography based assay as described by Applicant, even if there were some motivation to modify or combine the references, there would not be a reasonable expectation of success. Thus, Applicants respectfully assert that the cited references do not render Applicants' claimed invention unpatentable under 35 U.S.C. §103(a).

Dependent claims 2-10, 12, 13, 26, 28-37, 51 and 53 include all of the limitations of independent claims For at least these reasons, Applicants respectfully assert that as amended, claims 1-10, 12, 13, 26-37, 51, and 53 are not obvious under 35 U.S.C. §103(a), and that the rejection be withdrawn.

The Objection To Claims 14-25, 38-49, and 52 Is Rendered Moot

The Examiner stated that "[c]laims 14-25, 38-49, and 52 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims." Office Action at page 6.

Without in any way acquiescing to the Examiner's basis for rejection of claims 1-13, 26-37, 50, 51, and 53, Applicants have reworded claims 14-25, 38-49, and 52 to include all of the limitations of the base claim and any intervening claims as suggested by the Examiner. New claims 57-64 comprise originally filed claims 14-21, and new claims 66-69 comprise originally filed claims 22-25, amended to include all of the limitations of the base claim and any intervening claims. New claims 71-78 comprise originally filed claims 38-45, and new claims 80-83, and 85 comprise originally filed claims 46-49, and 52 amended to include all of the limitations of the base claim and any intervening claims. New claims 65, 70, 79, and 84 describe the application of multivariate analysis to the apparatus and methods and, as discussed above, are supported in the specification, for example at ¶¶ 53-61 and Example 2, describing application of multivariate analysis to

measurement of Fries in polycarbonate. Thus, Applicants respectfully assert that these new claims are in condition for immediate allowance.

CONCLUSION

In view of the foregoing amendment and remarks, each of the claims remaining in the application is in condition for immediate allowance. Accordingly, the Examiner is respectfully requested to reconsider and withdraw the outstanding rejections. The Examiner is respectfully invited to telephone the undersigned at (336) 747-7541 to discuss any questions relating to the application.

Respectfully submitted,

Date: 3-2-04

Cynthia B. Rothschild (Reg. No. 47,040)

KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, North Carolina 27101-2400
Phone: (336) 747-7541
Facsimile: (336) 607-7500

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